THERAPEUTIC
DIET
To CONTROL DISEASES

Author

Souvik Tewari
M.sc (1st class first) in food science, PhD scholar in Food Science and Technology, Dietician course in AMRI hospital, Bhubaneswar, Odisha, India

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Author: *Souvik Tewari*

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Foreword

In nutrition, diet is the sum of food consumed by a person or other organism. Therapeutic diet is concern with nutritional requirement of the patient suffering from the different type of diseases, prescribing the right type of diet, and it is prepared depending up on the nature of illness of the patient.

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Chapter - 1

Therapeutic Diet

Definition of Therapeutic Diet

Therapeutic diet is concern with nutritional requirement of the patient suffering from the different diseases and prescribing the right type of diet. It is prepared depending on the nature of illness of patient.

It is also called routine hospital diet.

Objectives

- Connecting of existing dietary deficiency.
- Maintaining the patient nutritional status.
- Formulation of diet to meet the needs of the patient taking into consideration his food habits.

Common Reasons Therapeutic Diets may be Ordered

- To maintain nutritional status
- To restore nutritional status
- To correct nutritional status
- To decrease calories for weight control
- To provide extra calories for weight gain
- To balance amounts of carbohydrates, fat and protein for control of diabetes
- To provide a greater amount of a nutrient such as protein
- To decrease the amount of a nutrient such as sodium
- To exclude foods due to allergies or food intolerance
- To provide texture modifications due to problems with chewing and/or swallowing

Types of Therapeutic Diet

It is classified in to three types

1. **Clear Liquid Diet**
    - Includes minimum residue fluids that can be seen through.
    - Examples are juices without pulp, broth.
    - Is often used as the first step to restarting oral feeding after surgery or an abdominal procedure.
    - Can also be used for fluid and electrolyte replacement in people with severe diarrhea.
    - Should not be used for an extended period as it does not provide enough calories and nutrients.

    Example: 10% glucose solution, coconut water.

2. **Full liquid Diet**
    - Includes fluids that are creamy.
    - Some examples of food allowed are ice cream, pudding, thinned hot cereal, custard, strained cream soups, and juices with pulp.
    - Used as the second step to restarting oral feeding once clear liquids are tolerated.
    - Used for people who cannot tolerate a mechanical soft diet?
    - Should not be used for extended periods.

    Example: Fruit juice, sugar containing milk, cereal soup.

3. **Soft Diet**
    - Soft in nature.
    - Used for post-operative patient.

    Example: boiled apple, pudding, different soup.

- **Common Types of Therapeutic Diets Include**

1. **Nutrient Modifications**
    - No concentrated sweets diet
    - Diabetic diets
    - No added salt diet
    - Low sodium diet
    - Low fat diet and/or low cholesterol diet
    - High fiber diet
    - Renal diet

2. **Texture Modification**
    - Mechanical soft diet
    - Puree diet
3. **Food Allergy or Food Intolerance Modification**
    - Food allergy
    - Food intolerance
4. **Tube Feedings**
    - Liquid tube feedings in place of meals
5. **Additional Feedings**

In Addition to Meal, Extra Nutrition may be ordered as

- **Supplements:** usually ordered as liquid nutritional shakes once, twice or three times per day; given either with meals or between meals
- **Nourishments:** ordered as a snack food or beverage items to be given between meals mid-morning and mid-afternoon
- **Half Strength (HS) Snack:** ordered as a snack food or beverage items to be given at the hour of sleep

➢ **The Following List Includes brief Descriptions of Common Therapeutic Diets (Nutritional Modification diet)**

1. **Diabetic or Calorie Controlled Diet (ADA)**
    - A Diabetes Diet (ADA) control calories, carbohydrates, protein, and fat intake in balanced amounts to meet nutritional needs, control blood sugar levels, and control weight.
    - Most commonly used calorie levels are: 1,200, 1,500, 1,800 and 2,000.
2. **No Added Salt (NAS) Diet**
    - Is a regular diet with no salt packet on the tray?
    - Food is seasoned as regular food.
3. **Low Sodium (LS) Diet**
    - May also be called a 2 gram Sodium Diet.
    - Limits salt and salty foods such as bacon, sausage, cured meats, canned soups, salty seasonings, pickled foods, salted crackers, etc.

- Is used for people who may be “holding water” (edema) or who have high blood pressure, heart disease, liver disease, or first stages of kidney disease.

4. **Low Fat/low Cholesterol Diet**

- Is used to reduce fat levels and/or treat medical conditions that interfere with how the body uses fat such as diseases of the liver, gallbladder, or pancreas.
- Limits fat to 50 grams or no more than 30% calories derived from fat.
- Is low in total fat and saturated fats and contains approximately 250-300 mg cholesterol.

5. **High Fiber Diet**

- Is prescribed in the prevention or treatment of a number of gastrointestinal, cardiovascular, and metabolic diseases.
- Increased fiber should come from a variety of sources including fruits, legumes, vegetables, whole breads, and cereals.

6. **Renal Diet**

- A renal diet is one that is low in sodium, phosphorous, and protein.
- A renal diet also emphasizes the importance of consuming high quality protein and usually limiting fluids.
- Some patients may also need to limit potassium and calcium.
- Every person’s body is different, and therefore, it is crucial that each patient works with a renal dietitian work to come up with a diet that is tailored to the patient’s needs.

7. **Vita K Restriction Diet**

- Acitrom is a one type of medicine that is used to dilute blood because unwanted blood clots may cause strokes, heart attacks, or other potentially harmful events such as clots in the legs (deep vein thrombosis) or lungs (pulmonary embolism).
- So in this condition vitamin K restriction diet is given to the patient diet because vitamin K helps to clot blood.

8. Pureed Diet

- Pureed diet is given to the patient who have trouble chewing, swallowing or fully breaking down (“digesting”) solid foods.
- “Pureed” means that all food has been ground, pressed, and/or strained to a soft, smooth consistency, like a pudding.

Chapter - 2

Therapeutic Diet to Different Control Types of Diseases

Fever

- **Definition of Fever**

The hypothalamic thermostat is engaged in body temperature adjustment by thermostatic and thermogenesis. The normal body temperature is 98 degree F or 37 degree C. the core temperature is known as fever.

- **Symptoms**
  - High temperature
  - Weakness
  - Loss of appetite
  - Head ache
- **Causes**

Fever may occurs due to following reasons which are classified into two categories.

1. **Endogenous Factor**

Antigen and antibody reaction

2. **Exogenous Factor**

Microbial infection, intake of toxin through the diet and intake of allergens through the diet.

➢ Development of Fever Due to Exogenous agent is Shown in The Following Flow Chart

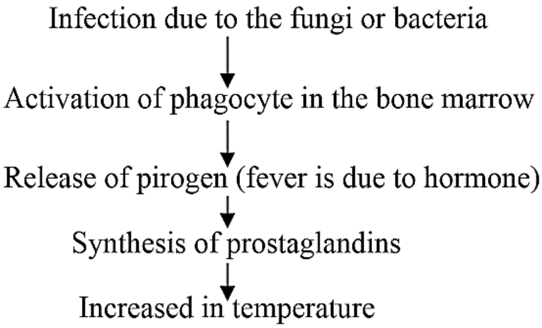
Infection due to the fungi or bacteria
Activation of phagocyte in the bone marrow
Release of pirogen (fever is due to hormone)
Synthesis of prostaglandins
Increased in temperature

Fig 1: Development of fever due to exogenous agent

➢ Changes During Febrile Condition

Different changes are noted during febrile condition. These changes are as follows.

1. Metabolic Changes

During fever the following major metabolic changes are noted in below.

- **Elevated of BMR (Basal Metabolic Rate)**

BMR is elevated 13%/ 1 degree C body temperature elevation.

- **Increased Catabolism of Tissue Protein**

In general febrile condition is known as protein de-generative disease, because a significant part of energy is derived by protein catabolism.

As a result ammonia production rate is increased, that elevated blood urine level.

- **Decrease of Storage Glycogen in Adipose Tissue**

During febrile condition the patient cannot consume adequate amount of diet. So glycogen and adipose tissue are break down foe supplying energy.

- **Loss of Body Water**

In this condition excess amount of water is eliminated from the body in the form of perspiration. The body fluid is diminished by 1.5-2.5 liter in fever.

- **Loss of Electrolytes**

Huge amount of electrolytes are loosed from the body with special reagent likes Na and K during fever.

2. Physiological Changes

- **Gastrointestinal Changes**

In febrile condition gastrointestinal changes are affected. The activities of digestive enzyme have been decreased. So digestion capabilities are decreased as a result fat is not digest during febrile condition.

- **Cardiovascular Changes**

During fever heart rate is elevated due to direct stimulatory effect of hot blood on special junction tissue of the heart.

➢ Types of Fever

Fever is classified into three categories

- **Short Term/ Acute Fever**

In this type of fever body temperature remain above the normal level for few hours to few days. Example- Influenza and cold

- **Long Term/ Chronic Fever**

In this type of fever the body temperature remains above the normal level for` few days to few weeks. Example- Typhoid

- **Intermitted Fever**

In this type of fever the body temperature remain above the normal level for few hours followed by remission and again the body temperature is elevated. Example- Malaria.

➢ Dietary Management of Fever

Principle of Diet

High calorie, high protein and moderate amount of fat should be given to the patient diet, and adequate amount of water should be given. Vitamin and minerals supplementary food should be included in the diet.

- **Energy**

The energy requirement should be increased as much as 50% over the normal level depending on the raising of temperature. Extra calories are required to maintain BMR.

- **Protein**

During fever loss of protein is increased, so the requirement of protein should be increased about 50% of the daily requirement. The intake of the protein should be 1.2-1.5 gm /kg of body weight.

Protein should be high nutritive value and easily digestible like skimmed milk, boiled egg and small fish etc

- **Carbohydrate**

Simple carbohydrate should be given to the patient diet, mainly in the form of glucose, which is less sweet and easily absorbed without digestion. Dietary fibre should be given in minimum amount.

- **Fat**

Fat rich foods like butter, ghee and vegetable oil etc should be given during fever.

- **Vitamin and Minerals**

The vitamin requirement is increased due to increase calorie requirement. During febrile condition, one multivitamin mineral tablet should be given. In this condition excess amount of electrolytes are eliminated from the body with special reagent like Na and K, so mineral like sodium and potassium rich food should be given to the patient diet.

- **Water**

Due to loss of body water, water requirement should be increased. Water intake in the form of fluid should be 3-5 liter/ day.

➢ **Dietary Guidelines**

  - High calorie rich food should be include
  - High protein diet should be given
  - Water and Fruit juice should be included in the diet
  - Fried food should be avoided
  - High spicy food should be avoided.

➢ **Food Should be Included**

  - Butter
  - Cream
  - Vegetable soup
  - Nuts
  - Freshly lemon, lime, orange or grapefruit juice extract diluted with half cup water and no sugar or ice should be included in the diet while one is suffering from high temperature.

- **Food Should be Avoided**
  - High spicy food
  - Alcohol
  - Avoid drinking unpasteurized milk or milk products.
  - Avoid eating red beef, fish, shellfish and any sort of meat as they are high in cholesterol and are not easy to digest.
  - Beverages like soda, carbonated soft drinks and beverages such as coffee and tea should be avoided.
  - Having alcoholic, tobacco and smoking should be avoided when suffering from high temperature.

Food Allergy

- **Definition of Food Allergy**

Food allergy denotes an adverse immunological response to specific substances with characteristics symptoms, when even food is ingested in the body.

It can also be defined as "altered reaction of the tissue to foreign protein and antigen"

- **Types of Allergy**

It can be classified into two Types

1. Immediate response
2. Delayed response

- **Clinical Features of Allergy**

Manifestation of allergen can occurs in any part of the body.

- **Skin Manifestation:** May include dermatitis, edema, fever and rashes.
- **Common Gastrointestinal:** Manifestation includes abdominal distension, constipation, diarrhea, nausea and vomiting.
- **Respiratory Symptoms Include:** Allergic asthma, bronchitis and nasal polyps.
- **Neurological Symptoms:** Such as anxiety, irritability, muscle pain, joint pain, and stomach pain etc.

- **Sources of Allergen**

- **Milk**

β-lacto globulin and casein in cow’s milk are major allergens, can cause eolic pain and passage of blood crythema reaction are found in children if they are allergic.

- **Fish**

Although allergic reaction is found to a particular fish for a particular person. Immediate type of hypersensitive are found, and urticaria, round smooth, dermatitis, gastrointestinal disorder are also noted.

- **Wheat Flour**

Person who are allergic to wheat flour develop antibody against wheat gluten. Severe allergic asthma are found against soya flour.

- **Peanuts**

After ingested the peanuts, abdominal distension and asthma have been found in some person.

- **Food Additives**

Food additives like metallic yellow and other color substances are very important sources of allergic reaction.

- **Diagnosis**

1. **Dietary History**
    - A careful dietary history should be taken in certain cases, if symptoms develop very rapidly and dermatically after immediate ingesting of the offending food, the patient can make his own diagnose.
    - In case of doubt, the patient is given a dairy in which he should recorded all food eaten and should also recornifestation.
    - Ati allergic drug like anti-histamine is used for the treatment of local form of allergy like urticaria.
    - Bronchodilator drugs are used for the treatment of bronchial spasms.
2. **Synthetic Food**
    - The diet consist of amino acid, sugar, salt mixture and vitamin concentration should be given.

- As they are a palatable, they have to be feed thrashed by naso gastric tube.
- Natural food should be given after cure of the patient.

3. By Hormone

Adrenaline, which can be used for the treatment of severe allergic reaction (anaphylaxis).

Peptic Ulcers

➢ Definition of Peptic Ulcers

Peptic ulcers are open sores that develop on the inside lining of the stomach and the upper portion of the small intestine. The most common symptom of a peptic ulartburn.

- **Nausea**

The most common peptic ulcer symptom is burning stomach pain. Stomach acid makes the pain worse, as does having an empty stomach. The pain can often be relieved by eating certain foods that buffer stomach acid or by taking an acid-reducing medication, but then it may come back. The pain may be worse between meals and at night.

➢ Less often, Ulcers may Cause Severe signs or Symptoms Such as

- Vomiting or vomiting blood — which may appear red or black
- Dark blood in stools, or stools that are black or tarry
- Trouble breathing
- Feeling faint
- Nausea or vomiting
- Unexplained weight loss
- Appetite changes

➢ Causes

The most common causes of peptic ulcers are infection with the bacterium Helicobacter pylori (H. pylori) and long-term use of aspirin and no steroidal anti-inflammatory drugs (NSAIDs) (Advil, Aleve, others). Stress and spicy foods do not cause peptic ulcers. However, they can make symptoms worse. Peptic ulcers occur when acid in the digestive tract eats away at the inner surface of the stomach or small intestine. The acid can create a painful open sore that may bleed. Digestive tract is coated with a mucous layer that normally protects against acid. But if the amount of acid is increased or the amount of mucus is decreased, patient could develop an ulcer. Common causes include:

- **A Bacterium:** Helicobacter pylori bacteria commonly live in the mucous layer that covers and protects tissues that line the stomach and small intestine. Often, the H. pylori bacterium causes no problems, but it can cause inflammation of the stomach's inner layer, producing an ulcer.

It's not clear how H. pylori infection spreads. It may be transmitted from person to person by close contact, such as kissing. People may also contract H. pylori through food and water.

- **Regular use of certain pain Relievers:** Taking aspirin, as well as certain over-the-counter and prescription pain medications called nonsteroidal anti-inflammatory drugs (NSAIDs) can irritate or inflame the lining of the stomach and small intestine. These medications include ibuprofen (Advil, Motrin IB, others), naproxen sodium (Aleve, Anaprox, others), ketoprofen and others. They do not include acetaminophen (Tylenol).

Peptic ulcers are more common in older adults who take these pain medications frequently or in people who take these medications for osteoarthritis.

- **Other Medications:** Taking certain other medications along with NSAIDs, such as steroids, anticoagulants, low-dose aspirin, selective serotonin reuptake inhibitors (SSRIs), alendronate (Fosamax) and risedronate (Actonel), can greatly increase the chance of developing ulcers.

➢ **Risk Factors**

- **Smoke:** Smoking may increase the risk of peptic ulcers in people who are infected with H. pylori.
- **Drink Alcohol:** Alcohol can irritate and erode the mucous lining of the stomach, and it increases the amount of stomach acid that is produced.

- **Have Untreated Stress.**
- **Eat Spicy Foods.**

Alone, these factors do not cause ulcers, but they can make them worse and more difficult to heal.

➢ Complications

Left Untreated, Peptic Ulcers can Result in

- **Internal Bleeding:** Bleeding can occur as slow blood loss that leads to anemia or as severe blood loss that may require hospitalization or a blood transfusion. Severe blood loss may cause black or bloody vomit or black or bloody stools.
- **Infection:** Peptic ulcers can eat a hole through (perforate) the wall of the stomach or small intestine, putting at risk of serious infection of the abdominal cavity (peritonitis).
- **Obstruction:** Peptic ulcers can block passage of food through the digestive tract, causing to become full easily, to vomit and to lose weight through either swelling from inflammation or scarring.

➢ Dietary Management

Principle

It was customary suggest bland diet for an ulcer patient. Bland diet is a diet which is mechanically, chemically and thermally non-irritating. Low fat and moderate protein rich food should be included in the diet.

- **Sound Total Nutrition**

There must be optimal over all nutrition intake to support recovery and maintain healthy tissue based on individual need and food tolerance.

- **Protein**

Protein provides the necessary amino acid for synthesis of tissue protein, which helps in healing ulcer. Milk should be included as a source of nutritional factor for healing purpose.

- **Fat**

Moderate amount of fat helps to suppress gastric secretion and motility, fat such as butter, cream, olive oil can be particularly helpful. But fried foods are not included in the diet because they are difficult to digest.

- **Carbohydrate**

Only millets cereals with low fibres should be included in the diet.

- **Vitamin and Minerals**

All vitamins in adequate amount should be given to the patient diet such as vitamin C, fruit juice and tomato juice should be included in the diet.

- **Spices and Condiments**

Spices food should be avoided because they irritate the colon and aggravates the ulcer.

- **Dietary Guidelines**
  - Fast foods and junk foods should be avoided
  - Milk and dairy products should be given
  - Spicy food should be avoided
  - Alcohol should be avoided
- **Food Should be Included**
  - Vegetables.
  - Fruits
  - Milk and dairy products
  - Meat and other proteins
  - Snacks
  - Condiment
- **Food should be Avoided**
  - Spicy foods
  - Caffeine
  - Alcohol
  - Chocolate
  - Bread and grains
  - Vegetables
  - Fruits
  - Milk and dairy products
  - Meats
  - Fats Snacks

Liver disease

Definition of Chronic Liver Disease

Chronic liver disease is a disease of the liver that involves a process of progressive destruction and regeneration of the liver parenchyma leading to fibrosis and cirrhosis. "Chronic liver disease" refers to disease of the liver which lasts over a period of six months. It consists of a wide range of liver pathologies which include inflammation (chronic hepatitis), liver cirrhosis, and hepatocellular carcinoma.

➢ Phases of liver Disease

1. Fatty Liver

Fatty liver, or hepatic steatosis, is a term that describes the buildup of fat in the liver. It’s normal to have some fat in liver, but too much can become a health problem. Fatty liver is a reversible condition that can often be resolved with lifestyle modifications. In many cases, fatty liver has no symptoms. It doesn’t usually cause permanent damage unless it progresses.

2. Hepatitis

Hepatitis is an inflammation of the liver. The condition can be self-limiting or can progress to fibrosis (scarring), cirrhosis or liver cancer. Hepatitis viruses are the most common cause of hepatitis in the world but other infections, toxic substances (e.g. alcohol, certain drugs), and autoimmune diseases can also cause hepatitis.

There are 5 main hepatitis viruses, referred to as types A, B, C, D and E. These 5 types are of greatest concern because of the burden of illness and death they cause and the potential for outbreaks and epidemic spread. In particular, types B and C lead to chronic disease in hundreds of millions of people and together are the most common cause of liver cirrhosis and cancer.

3. Liver cirrhosis

Cirrhosis is a complication of liver disease which involves loss of liver cells and irreversible scarring of the liver. Alcohol and viral hepatitis B and C are common causes of cirrhosis, although there are many other causes. Cirrhosis can cause weakness, loss of appetite, easy bruising, yellowing of the skin (jaundice), itching, and fatigue.

➢ Symptoms of Cirrhosis of the Liver

Individuals with cirrhosis may have few or no symptoms and signs of liver disease. Some of the symptoms may be nonspecific, that is, they don't suggest that the liver is their cause. Some of the more common symptoms and signs of cirrhosis include:

- Yellowing of the skin (jaundice)
- Fatigue
- Weakness

- Loss of appetite
- Itching
- Decreased blood clotting factors

4. Liver Carcinoma

Liver cancer is a type of cancer that starts in the liver. Some cancers develop outside the liver and spread to the area. However, only cancers that start in the liver are described as liver cancer.

- **Symptoms:** The signs and symptoms of liver cancer tend not to be noticed until the cancer reaches an advanced stage. Liver cancer may trigger the following effects:
  - Jaundice
  - Abdominal pain
  - Unexplained weight loss
  - An enlarged liver
  - Fatigue
  - Nausea, vomiting
  - Back pain
  - Itching

- **Causes of chronic liver disease (CLD)**

The List of Conditions Associated with Chronic Liver Disease is Extensive and can be categorized in the Following Way

1. Viral Causes

- Hepatitis B
- Hepatitis C

Cytomegalovirus (CMV), Epstein Barr virus (EBV), and yellow fever viruses cause acute hepatitis.

2. Toxic and Drugs

- Alcoholic liver disease
- Rarely drug induced liver disease from methotrexate, amiodarone, nitrofurantoin and others.

3. Metabolic

- Non-alcoholic fatty liver disease

- Haemochromatosis
- Wilson’s disease due to copper metabolism

4. **Autoimmune Response Causes**

- Primary biliary cholangitis (previously known as primary biliary cirrhosis)
- Primary sclerosing cholangitis**.**

➢ Complications of Cirrhosis

- **Edema and Ascites:** Ascites is the accumulation of fluid (usually serous fluid which is a pale yellow and clear fluid) that accumulates in the abdominal (peritoneal) cavity. The abdominal cavity is located below the chest cavity, separated from it by the diaphragm. Ascitic fluid can have many sources such as liver disease, cancers, congestive heart failure, or kidney failure.

As cirrhosis of the liver becomes severe, signals are sent to the kidneys to retain salt and water in the body. The excess salt and water first accumulates in the tissue beneath the skin of the ankles and legs because of the effect of gravity when standing or sitting. This accumulation of fluid is called peripheral edema or pitting edema. (Pitting edema refers to the fact that pressing a fingertip firmly against an ankle or leg with edema causes an indentation in the skin that persists for some time after release of the pressure. Actually, any type of pressure, such as from the elastic band of a sock, may be enough to cause pitting).

- **Spontaneous Bacterial Peritonitis (SBP)**

Fluid in the abdominal cavity (ascites) is the perfect place for bacteria to grow. Normally, the abdominal cavity contains a very small amount of fluid that is able to resist infection well, and bacteria that enter the abdomen (usually from the intestine) are killed or find their way into the portal vein and to the liver where they are killed. In cirrhosis, the fluid that collects in the abdomen is unable to resist infection normally. In addition, more bacteria find their way from the intestine into the ascites. Therefore, infection within the abdomen and the ascites, referred to as spontaneous bacterial peritonitis or SBP, is likely to occur. SBP is a life- threatening complication. Some patients with SBP have no symptoms, while others have fever, chills, abdominal pain and tenderness, diarrhea, and worsening ascites.

- **Bleeding from Esophageal Varices (Portal Hypertension)**

In the cirrhotic liver, the scar tissue blocks the flow of blood returning to the heart from the intestines and raises the pressure in the portal vein (portal hypertension). The most common veins through which blood bypasses the liver are the veins lining the lower part of the esophagus and the upper part of the stomach. As a result of the increased flow of blood and the resulting increase in pressure, the veins in the lower esophagus and upper stomach expand and then are referred to as esophageal and gastric varices, the larger the varices and the more likely a patient is to bleed from the varices into the esophagus or stomach.

- **Hepatic Encephalopathy**

Some of the protein in food that escapes digestion and absorption is used by bacteria that are normally present in the intestine. While using the protein for their own purposes, the bacteria make substances that they release into the intestine. These substances then can be absorbed into the body. Some of these substances, for example, ammonia, can have toxic effects on the brain. Ordinarily, these toxic substances are carried from the intestine in the portal vein to the liver where they are removed from the blood and detoxified.

As previously discussed, when cirrhosis is present, liver cells cannot function normally either because they are damaged or because they have lost their normal relationship with the blood. In addition, some of the blood in the portal vein bypasses the liver through other veins. The result of these abnormalities is that toxic substances cannot be removed by the liver cells, and, instead, the toxic substances accumulate in the blood.

- **Hepatorenal Syndrome**

Patients with worsening cirrhosis can develop hepatorenal syndrome. This syndrome is a serious complication in which the function of the kidneys is reduced. It is a functional problem in the kidneys, meaning there is no physical damage to the kidneys. Instead, the reduced function is due to changes in the way the blood flows through the kidneys themselves. The hepatorenal syndrome is defined as progressive failure of the kidneys to clear substances from the blood and produce adequate amounts of urine while other important functions of the kidney, such as retention of salt, are maintained. If liver function improves or a healthy liver is transplanted into a patient with hepatorenal syndrome, the kidneys usually begin to work normally again. This suggests that the reduced function of the kidneys is the result of either the accumulation of toxic substances in the blood or abnormal liver function when the liver fails. There are two types of hepatorenal syndrome. One type occurs gradually over months. The other occurs rapidly over a week or two.

- **Hepatopulmonary Syndrome**

Rarely, some patients with advanced cirrhosis can develop hepatopulmonary syndrome. These patients can experience difficulty breathing because certain hormones released in advanced cirrhosis cause the lungs to function abnormally. The basic problem in the lung is that not enough blood flows through the small blood vessels in the lungs that are in contact with the alveoli (air sacs) of the lungs. Blood flowing through the lungs is shunted around the alveoli and cannot pick up enough oxygen from the air in the alveoli. As a result the patient experiences shortness of breath, particularly with exertion.

- **Hypersplenism**

The spleen normally acts as a filter to remove older red blood cells, white blood cells, and platelets (small particles that are important for the clotting of blood.). The blood that drains from the spleen joins the blood in the portal vein from the intestines. As the pressure in the portal vein rises in cirrhosis, it increasingly blocks the flow of blood from the spleen. The blood "backs-up," accumulating in the spleen, and the spleen swells in size, a condition referred to as splenomegaly. Sometimes, the spleen is so enlarged that it causes abdominal pain.

As the spleen enlarges, it filters out more and more of the blood cells and platelets until their numbers in the blood are reduced. Hypersplenism is the term used to describe this condition, and it is associated with a low red blood cell count (anemia), low white blood cell count (leucopenia), and/or a low platelet count (thrombocytopenia). The anemia can cause weakness, the leucopenia can lead to infections, and the thrombocytopenia can impair the clotting of blood and result in prolonged bleeding.

- **Liver Cancer (Hepatocellular Carcinoma)**

Cirrhosis due to any cause increases the risk of primary liver cancer (hepatocellular carcinoma). Primary refers to the fact that the tumor originates in the liver. A secondary liver cancer is one that originates elsewhere in the body and spreads (metastasizes) to the liver.

The most common symptoms and signs of primary liver cancer are abdominal pain and swelling, an enlarged liver, weight loss, and fever. In addition, liver cancers can produce and release a number of substances, including ones that cause an increased in red blood cell count (erythrocytosis), low blood sugar (hypoglycemia), and high blood calcium (hypercalcemia).

- **Diagnostic Test**

Chronic liver disease takes several years to develop and the condition may not be recognised unless there is clinical awareness of subtle signs and investigation of abnormal liver function tests. Testing for chronic liver disease involves blood tests, imaging including ultrasound and a biopsy of the liver. The liver biopsy is a simple procedure done with a fine thin needle under local anaesthesia. The tissue sample is sent to a laboratory where it is examined underneath a microscope.

- **Liver Biopsy:** In this procedure a tissue samples from the liver are collected with a needle during minor surgical procedure for examination under amicroscope.
- **CT scan:** Computerised Tomographic Scan is a diagnostic imaging procedure that uses combination of x ray and computer technology to produce horizontalor axial images of the body. CT scans are more detailed compared to general x-rays.
- **Cholangiography:** X ray examination of the bile ducts using an intravenousdye called contrast media.
- **Ultrasound (Sonography):** It is a diagnostic imaging technique which useshigh frequency sound waves and a computer to create images of blood vessels, tissues and organs. Ultrasound is mainly used to view internal organs of the abdomen such as the liver, spleen and kidneys and to assess blood flow through various vessels.
- **Liver Function Test:** Liver tests (LTs) are blood tests used to assess the general state of the liver or billiary system. Few of these tests actually measure how well the liver or billiary system is functioning, but rather reflect the presence of damage or inflammation. LTs are used to guide the physician along with the history and physical examination, in the diagnosis and management of a number of liver diseases. A problem in relying on these biochemical tests is that they are indirect measurements from the blood, of what is happening in the liver.

- **Dietary Management**

- **Carbohydrates**

Carbohydrates are the main source of energy for the body. Like fat they do not raise the levels of toxins in the body. 1 g of carbohydrate provides the body with 4 kilocalories (kcal). Foods that are rich in carbohydrate include: sugar, sweets, fruit, and bread, foods made with flour, potatoes, milk and vegetables. Glucose is converted to glycogen in the liver, which is later to derive energy in the intervals between ingestion of food. Glycogen is stored in liver. Glucose converts the non-carbohydrate metabolites like amino acids, fats, glycerol, etc. into glucose to maintain the glucose level of blood. Carbohydrate are found in bread, pasta, rice, cereal, grains (rice, oats), and starchy vegetables (potatoes, corn, peas). Liver disease may cause blood sugar level to be too high or too low in some peoples.

- **Roughage**

Roughage reduces the “toxin level” Non-digestible roughage is also classed among the carbohydrates. Roughage (or fiber) consists of those parts of vegetable foodstuffs that cannot be utilized by the human body. Roughage promotes digestion, slows the rise in blood sugar, reduces the level of cholesterol and improves the sensation of satiety. For patients with cirrhosis of the liver it is of particular importance that it binds toxins in the bowel. Foods that are high in fiber include: whole meal bread, crisp bread, fruit, vegetables, potatoes, brown rice, whole meal noodles or bran.

- **Protein**

It is important to eat the right amount of protein in case of liver disease. Following foods are good sources of protein with the amount of protein (in grams)

Experts Recommend the Following Protein Intakes

- 1.2 g of protein per kg body weight each day in compensated liver cirrhosis
- 1.5 g of protein per kg body weight each day in de compensated liver cirrhosis and malnutrition. In no case should one respond automatically to a diagnosis of liver cirrhosis with restriction in protein intake. It is not difficult to understand that a person with a protein deficient diet is further jeopardized by restrictions in protein intake. Physicians are often concerned that an adequate protein intake may trigger hepatic encephalopathy. This fear is based on

experiences with a very small group of problematic patients in whom protein intake at recommended levels does result in encephalopathy. This is the “protein dilemma” in which adequate protein is good for malnutrition but bad for encephalopathy and vice-versa. This dilemma, however, does not apply in 99% of patients with liver cirrhosis, in whom other triggers, such as infection, bleeding, drugs, renal failure, electrolyte imbalance and constipation, are present. Beside the amount, the quality of protein also is important. This is especially true for all sick persons and very especially for persons with liver disease. Patients with cirrhosis are deficient in branched-chain amino acids (BCAA), but have an excess of aromatic amino acids (AAA). In addition, the amino acids glutamic acid, methionine and sometimes cysteine are elevated in the blood of cirrhotic patients.

Foodstuffs with a high BCAA content include milk and dairy products and vegetable foods. Meat and fish, on the other hand, have high AAA content. The BCAA (valine, leucine and isoleucine) counteract encephalopathy, while the AAA (tyrosine, phenylalanine) and methionine promote it. BCAA are metabolized independent of the liver predominantly in muscles and the level of waste products does not increase as a result of their being broken down. BCAA also inhibit the breakdown of protein in muscles.

- **Fat**

Some people with liver disease have problems digesting and absorbing fat, that fat which is not digested is eliminated in bowel movements. So need low fat diet if this type of problem seen. At 9 kilocalories (kcal) per gram, fat is the most energy rich foodstuff. Fat does not increase toxic levels of ammonia in hepatic encephalopathy. It is used as a source of energy and as an energy store. The intake of animal fats should not be too high and the intake of vegetable fats should not be too low. In about 40% of the patients suffering from cirrhosis of the liver the digestion of fats is disturbed because of poor fat utilization and absorption. This may also affect the absorption of fat-soluble vitamins (A, D, E and K), which may lead to deficiency and must be supplemented parenterally in these patients. In steatorrhea, special fat (MCT-fat) can be used. MCT is the abbreviation for medium chain triglycerides. MCT fats can be absorbed in the bowel even in the absence of bile acids and reach the body as a source of energy. MCT-fats do not naturally occur in foods.

- **Minerals**

1. **Sodium**

In case of liver disease the amount of sodium in diet should less if the body is retaining fluids. Retain fluid causes swelling in the body. So in this case that patient need low sodium diet.

2. **Potassium**

Salt substitutes generally contain potassium in place of sodium compounds. In addition to an improvement in taste, they have the advantage of the high potassium content. A potassium-rich diet is particularly important for patients who take diuretics to get rid of fluid, as potassium deficiency can otherwise occur. Particularly rich in potassium are all types of vegetables (particularly cabbage, potatoes, herbs, tomatoes, spinach, tomato pulp, mushrooms and chanterelles), fruit (particularly avocado, apricots, bananas, fruit juices and dried fruit). When edema is present, fluid intake must be restricted so that a potassium-rich diet must often fall through. Potassium-rich foods also contain a lot of water.

- **Vitamins**

Patients with cirrhosis of the liver often show a deficiency in minerals (zinc, iron, calcium, potassium) and vitamins (A, D, E, K, folic acid, B1, B2, B6, B12). Because supplementation in the form of tablets, capsules or drops is much easier than the demonstration of a deficiency, some experts recommend the pragmatic solution of simply prescribing these preparations. Many patients with cirrhosis of the liver suffer from a marked zinc deficiency. When zinc is given in tablet form, hepatic encephalopathy often improves. Particularly good here are zinc tablets containing organic zinc compounds such as zinc histidine, which are more reliably absorbed from the bowel than inorganic zinc salts.

- **Liquids**

A restriction in the amount of fluid drunk is only required if the level of sodium in the blood is too low or in case of edema or ascites. The amount consumed should be reduced to 500–1000 ml. When the fluid intake is low, only drinks that quench the thirst should be chosen. Milk, mixed drinks, sweetened soft drinks or teas, and high sodium mineral waters are not appropriate. Mineral water, which is also used to supply the calcium requirement, is thirst quenching. In all other cases the amount of liquid taken should be 1.5–2 liters, as with healthy people. If swelling present then liquid amount must be less. Liquids includes water, milk, juice, soda, soup, and beverages. Foods that are liquid at room temperature, such as gelatin popsicles must also be counted as a liquid. So it is depending upon the disease condition that how much liquid to be taken.

➢ Definition of Jaundice

Jaundice is a condition in which the skin and eye (white) of patient are discolored yellows due to increase level of bile pigment in the blood, resulting from liver disease.

Jaundice may also be called “Interus” this word comes from “Greek” word.

➢ Causes

Jaundice may occur due to the following reasons

- The liver is over loaded and damage
- The infection of liver from viruses (hepatitis B and C)
- Blood disorder
- Use of certain drugs
- Cancer of pancreas
- Low intake of water

➢ Symptoms

- The skin of the patient become yellow discolored.
- The white of the eye become yellow.
- Headache
- Fever
- Sever constipation
- Weakness and weight loss

➢ Types of Jaundice

Jaundice can be classified into three groups

1. Pre-hepatic/ hemolytic
2. Hepatic/ hepatocellular
3. Post- hepatic/ obstructive

- **Dietary Management of Jaundice**

- **Energy**

During hepatic pre-coma and coma about 1000 kcal are supplied, in case of severe and moderate jaundice about 1500-2000 kcal are supplied

- **Protein**

Adequate amount of protein should be given to the patient diet depending upon the severity of the disease. With hepatic pre-coma and coma, protein containing food completely withheld. With severe jaundice 40 gm protein should be given/ day that helps to regenerate the hepatic cell. When the jaundice is mild 60-80 gm protein should be given/ day

- **Fat**

Fat should also given depending up on the severity of the condition. In hepatic pre-coma and coma fat not given, in severe jaundice about 30 gm fat is given daily, in mild to moderate jaundice about 50-60 gm fat should be given/day.

- **Carbohydrate**

Carbohydrates are the main source of calorie in the diet. In hepatic pre-coma and coma condition food rich in carbohydrate should be given to the patient diet, in severe jaundice fruit juice, pudding containing sugar should be given and in case of mild to moderate jaundice cereal can be given.

- **Vitamin and Minerals**

A multi vitamin mineral tablet (vita-C) should be administered.

Diabetes Mellitus

- **Definition of Diabetes**

Diabetes mellitus is a chronic metabolic disorder that prevents the body to utilise glucose completely or partially. It is characterised by raised glucose level in the blood and alteration in carbohydrate, protein, and fat metabolism. It can be due to failure the formation of insulin or liberation or action.

- **Classification of Diabetes**

It is mainly classified into two categories

1. **Type- I/ IDDM**

The full form of IDDM is Insulin Dependent Diabetes Mellitus. It is also known as Juvenile own set diabetes mellitus. It occurs in younger age group. In this diabetes mellitus, the pancreas is unable to produce insulin.

Causes: It is caused by virus or due to autoimmunity

2. Type-II/ NIDDM

The full form of NIDDM is Non-Insulin Dependent Diabetes Mellitus. It is also known as adult own set diabetes mellitus, it is developed slowly and more stable in the body. In this diabetes mellitus insulin may be produces but their action is impaired.

Causes

- **Life Style:** The people who are obese and follow sanitary life style and consume over eating, they are suffering from NIDDM.
- **Genetic Factor:** Genetic factors are more important in the development of this type of diabetes.
- **Age:** It occurs mainly in middle age group and elder people.

3. Other Types of Diabetes Mellitus

- **Malnutrition Related Diabetes Mellitus**

This type of diabetes mellitus is mainly seen in some tropical countries. It occurs in the people between 15-30 years of age. In this diabetes, the pancreas fails to produce adequate insulin.

- **GDM (Gastrointestinal Diabetes Mellitus)**

During normal pregnancy the level of plasma insulin is raised by the action of placental hormones. The pancreas may be unable to meet this demand in women genetically predisposed to develop this type of diabetes.

➢ Symptoms of Diabetes Mellitus

- Hyper glycaemia
- Glycosuria (sugar in urine)
- Polyphesia, (increased hunger)
- Polydipsia (increased thrust)
- Polyurea
- Weight loss
- Blurred vision
- Weakness
- Loss of strength
- Acidosis

- **Diagnostic Test**

- **Random Blood Sugar**

A random blood glucose exceeding 200 gm/ dl is almost certain to indicate diabetes.

- **Glycosuria**

  1. Urine is voided just before meal
  2. Breakfast is taken with usual helping of carbohydrate rich food such as rice, fruit and sweets.
  3. Two to three hours after the taken meal urine is voided and examined for sugar.

- **Ketonuria**

The amount of ketone bodies normally excreted by healthy persons are not detected by routine methods. High amounts excreted can be detected in the urine by nitroprusside reaction which is conveniently carried out using Acetest tablet or ketostix paper sticks. If both ketonuria and glycosuria are found, the diagnosis of diabetes is practically certain.

- **Glucose Tolerance Test**

The glucose tolerance test is a medical test in which glucose is given and blood samples taken afterward to determine how quickly it is cleared from the blood. The test is usually used to test for diabetes, insulin resistance, impaired beta cell function, and sometimes reactive hypoglycemia and acromegaly, or rarer disorders of carbohydrate metabolism. In the most commonly performed version of the test, an oral glucose tolerance test (OGTT), a standard dose of glucose is ingested by mouth and blood levels are checked two hours later. Many variations of the GTT have been devised over the years for various purposes, with different standard doses of glucose, different routes of administration, different intervals and durations of sampling and various substances measured in addition to blood glucose.

- **Dietary Management**

Principle of Diet

Low calorie, low sugar, high protein, high fibre and moderate amount of fat rich food should be given and adequate amount of vitamin (mainly vita-C and E) should be given in the diet. Minerals like Zn should be prescribed in this condition.

- **Carbohydrate**

Carbohydrate is maintained to about 60-65% as total calorie requirement. Polysaccharide likes bread, cereal, monosaccharide and disaccharide likes chocolate, sweet should be avoided in the patient diet. During digestion, sugars (simple carbohydrates) and starches (complex carbohydrates) break down into blood glucose. Focus on the healthiest carbohydrates, such as fruits, vegetables, whole grains, legumes (beans, peas and lentils) and low-fat dairy products.

- **Protein**

A high amount of protein is good for the health of diabetic patient, because it supply amino acid which is needed for the tissue repairer.

- **Fat**

Fat requirement is maintained is about 15-25% of the total calorie requirement. PUFA should be given to the patient diet.

- **Dietary Fibre**

Dietary fibre also helpful for the type I and type II diabetes mellitus. Such diets lower Insulin requirements, increase peripheral tissue insulin sensitivity, decrease serum cholesterol and triglyceride value, aid in weight control and lower blood pressure. Soluble fibre such as pectin, gums hemicelluloses (in fruits) increase intestinal transit time, delay gastric emptying slow glucose absorption and lower serum cholesterol. 20-30 gm of soluble fibre should be taken. Insoluble fibre such as cellulose and lignin (vegetables, grains) decrease intestinal transit time, increase faecal bulk, delay glucose absorption and slow starch hydrolysis. Diet high in carbohydrate and fibre improve glucose metabolism without increasing insulin secretion. They lower fasting serum and peripheral insulin concentration in response to oral glucose administration in both diabetic and non-diabetic individual.

- **Vitamin and Minerals**

Vitamin particularly vita-C and E are given to the patient diet because it acts as a antioxidant. Mineral like Zn is given to the patient diet.

- **Insulin Therapy**

Insulin therapy mainly used for the treatment of type I (IDDM) because in this diabetes mellitus pancreas is not able to produce adequate amount of insulin so, for the management of diabetes mellitus insulin therapy is needed.

There are several therapy, out of these insulin therapy is most important

There are three types of insulin, which is needed for the management of diabetes. These are

1. Short acting insulin
2. Intermediate acting insulin
3. Long acting insulin

- **Nature of Insulin**

Table: 1 Nature of insulin

Nature of Insulin	Onset of Action	Peak Action	Duration
1. Short acting insulin	½ an hours	2-4 hours	6-8 hours
2.Intermediate acting insulin	2 hours	8-10 hours	20-26 hours
3. Long acting insulin	4 hours	10-14 hours	26-36 hours

Complex carbohydrate containing meal should be given to the patient at least ½ hours before the peak action of the insulin. Generally in case of short acting insulin 3 injections are prescribed /day, but in case of intermediate acting insulin 2 injections are prescribed / day, and in case of long acting insulin 1 injection is prescribed / day.

- **Special Diabetic Foods**

1. Broccoli

Broccoli is an anti-diabetic food. It contains a compound called sulforaphane which triggers several anti-inflammatory process that improve blood sugar control and protect blood vessel from cardiovascular damage.

2. Blue Berry

It is also an anti-diabetic fruits. It contains both insoluble and soluble dietary fibre. If the patient taken ½ cup blue berry juice / day for 12 weeks, lowered blood glucose level and improved memories. It also stimulates the release of adiponectin hormones that regulates blood glucose level and increase insulin sensitivity.

3. Olive Oil

Olive oil contain antioxidant vitamin likes vita- C and E that helps to relieve diabetes and that protect cell from damage and prevent the development of heart disease.

4. Oats

Oats meal contain high amount of magnesium which helps the body use glucose and secrete insulin properly and they contain antioxidant that challenged in a good way and allowing blood glucose to remain more stable.

- **Dietary Guideline for Diabetes**
  - Don't skip meals
  - Choose foods low on the glycemic index
  - Use good fats
  - Exercise regularly
  - High fibre rich food should be given
  - High protein diet should be included in the diet
  - Insulin therapy for the management of the diabetes
- **Food Should be Included**
  - **Broccoli**
    - Olive oil
    - Oats
    - Blue berry
    - Bran oil
    - Leafy vegetable
    - Irish potato
- **Food should be Avoided**
    - Sweet
    - Potato
    - Sugar,
    - Honey
    - Ghee
    - Excess amount of Salt
    - Tea and coffee more than two cup/day
    - White flour and its products

Renal Disease

- **Definition of Nephritis**

Nephritis is an inflammatory condition of kidneys. It can be caused by diabetes, lupus, infections and a number of other kidney related disease and condition.

- **Type of Nephritis**

It can be classified into two phases

1. **Type-I/ acute nephritis:**

It occurs in young children and adult. In this condition urea and other waste product are retain in the tissue.

- **Complication**
  - Acute renal failure
  - Hypertension
  - Edema
  - Proteinurea

2. **Type-II/ Chronic Nephritis**

It occurs in all age group. In this condition edema develops in patient, so Na requirement should be restricted.

- **Glomerulo Nephritis**

Glomerulo nephritis is also known as glomerular nephphritis (G.N) or glomerular disease. It is a disease of kidney, characterized by inflammation of the glomeruli.

Glomeruli are very small blood vessels in the kidney, from this vessels all waste products are excrete. In this disease kidney are unable to remove waste and excess fluid from the body.

- **Causes**
  - Streptococcus β- haemolyticus
  - Streptococcus infections of wounds or skin.
  - Drugs
  - Collagen disease such as Systematic Lupus Erythematosus (SLE)
  - Staphylococcus, pneumococcus, plasmodium malariae.
- **Symptoms**
  - Blood and protein (albumin) may be found in the urine.
  - Hypertension
  - Edema
  - Swelling around the ankles

- Puffiness around the eyes
- Headache, nausea and vomiting.

➢ Management of the Glomerulo Nephritis

Principle of Diet

Low protein, high carbohydrate, low sodium and low potassium diet with restricted fluid is given to the patient diet

- **Energy**

The intake of energy should be about 1700 kcal, sufficient calorie is given without increasing the protein intake by means of sugar, honey, glucose, sagu, fats and oils.

- **Fat**

The end product of fat metabolism do not depend on the kidneys for their excretion and so fat can be administered.

- **Carbohydrate**

The main source of carbohydrate is cereal (rice, wheat and cornflakes)

- **Protein**

Protein requirement should be reduced. During acute stage, if urine stop, protein containing food should be avoided and 10-20% glucose should be given. When urine flow recommended then protein requirement should be increased 20-30 gm daily. If urine is passed 500-700 ml /day about 0.5 gm protein/kg body weight is allowed.

- **Vitamin and Minerals**

Vita- C 100 gm thrice daily should be given as deficiency has been noted in acute nephritis, vita-B complex is also useful. If the person suffers from edema then the intake of sodium should be decreased and potassium also given in restricted amount when there is saintly flow of urine.

Vegetable should be chopped and boiled in excess water.

- **Fluid**

During the first stage of treatment the fluid should be decreased to prevent the edema condition. Daily weighting is needed to maintain overall fluid balance.

In latter stage fluid intake is based on the volume of fluid excreted and allowances of 500-700 ml/ day are given for the insensible water loss.

Types of Kidney Disease

Kidney disease is broadly classified into acute kidney injury and chronic kidney disease.

1. Acute Kidney Injury

Acute kidney injury is sudden damage to the kidneys. In many cases it will be short term but in some people it may lead to long-term chronic kidney disease.

2. Chronic Kidney Disease

More often, kidney function worsens over a number of years. This is known as chronic kidney disease. Sometimes it can progress to end stage kidney disease, which requires dialysis or a kidney transplant to keep you alive.

Causes of Renal Failure

- **Main Causes**
  - Loss of blood flow to the kidneys.
  - Polycystic kidney
  - Chronic infection of the urinary tract.
  - Kidney stones
- **Others Causes**
  - Type 1diabetes
  - General anesthesia and surgical operation reduced renal blood flow
  - Nephrotoxins like Paracetamol and some variety of mushrooms.

Symptoms of Acute Renal Failure

- Low Urine Volume (Anuria Or Oliguria)
- Serum Urea Nitrogen And Creatinine Levels Are Increase
- Bloody Stools
- Breath Odor
- Slow, Sluggish Movements
- Generalized Swelling Or Fluid Retention
- Fatigue
- Pain Between Ribs And Hips
- Hand Tremor

- Bruising Easily
- Changes In Mental Status Or Mood, Especially In Older Adults
- Decreased Appetite
- Decreased Sensation, Especially In Your Hands Or Feet
- Prolonged Bleeding
- Seizures
- Nausea
- Vomiting
- High Blood Pressure
- A Metallic Taste In Your Mouth

➢ **Symptoms of Chronic Renal Failure**

- Need To Urinate Frequently, Especially At Night (Nocturia);
- Swelling Of The Legs And Puffiness Around The Eyes (Fluid Retention);
- High Blood Pressure;
- Fatigue And Weakness (From Anemia Or Accumulation Of Waste Products In The Body);
- Loss Of Appetite, Nausea And Vomiting, Itching, Easy Bruising, And Pale Skin (From Anemia)

➢ **Kidney Stone/ Urinary Calculi**

Kidney stone may be found in the kidney, ureator bladder or the urethra. They are made up of organic matrix into, which of various sizes are inter spreads. Mainly due to lack of water, the salt, minerals and other substances in the urine can stick together and form a stone, which is known as kidney stone.

➢ **Clinical Symptoms**

- Acute and severe pain
- Fever
- The person may feel exhausted
- Pain on urination
- Nausea and vomiting

- **Causes**

- **Lack of Water**

If the person does not intake adequate amount of water, then the person suffer from the kidney stone. In this condition due to lack of water the salt, mineral and other substances in the urine can stick together and form a stone. It is the most common cause of kidney stone.

- **Medical Condition**

Many medical conditions can affect the normal balanced and helps to form kidney stone.

- **Modification of Diet**

- **Fluid Intake**

The intake of fluid should be increased as much as possible depending on the tolerance of the patient. It helps to dilute the urine, which is the main compound of stone formation. 3 liters of fluid / day should be given.

- **Diet**

It may involve with restriction amount of minerals, which is main component of the stone. Minerals that may be restricted are

- **Calcium Restriction**

These minerals may be restricted along with oxalate. Ca may be permitted to be consuming up to 400-600 mg/ day. Phosphorus may be permitted to be consume up to 2 gm/day. Food rich in calcium and phosphorus should be given in restricted amount.

- **Oxalate Restriction**

All food which contain large amount of oxalate should be avoided if the stone is a ca oxalate stone.

- **Dialysis**

The modern artificial technique has proved a boon to the patient suffering from acute or chronic renal failure. Dialysis may be employed on a daily basis or two to three times a weeks depending upon the amount of toxic waste products accumulating in the blood. Dialysis is a procedure that helps to replace kidney’s normal function.

➢ Types of Dialysis

1. Hemo-Dialysis

It is used to remove the waste products from the blood and restore the body's chemical balance. Hemo-dialysis patient unable to take supplement orally.

2. Peritoneal Dialysis

In this type the patient's blood is cleaned within the body.

➢ Complication of the Dialysis

This can be infectious or non- infectious. Infectious complication includes peritonitis tunnel infection and exit the side infection.

➢ Draw backs of Dialysis

- Dialysis can only control kidney failure, but does not cure (control) kidney disease.
- Dialysis is very expensive
- Discomfort is seen, when niddles are injected for hemo-dialysis.

➢ Dietary Management for Dialysis Patient

Principle of Diet

Dialysis changes dietary needs. Patients undergoing typical hemo-dialysis, involving about three treatments per week, follow diets that are restricted in protein, sodium, potassium, phosphorus, and fluid. Patients on continuous ambulatory peritoneal dialysis, involving several dialysate exchanges per day, can be more liberal in protein, sodium, potassium, and fluid intake.

- **Sodium**

Sodium intake must be modified to prevent hypertension, congestive heart failure, and pulmonary edema. Limiting intake will help avoid thirst and maintain acceptable fluid balance. Restrictions range from 1,000-3,000 milligrams per day with hemo-dialysis and 2,000-4,000 milligrams per day for peritoneal dialysis. Major salt sources are described below.

- **Fluid**

Fluid consumption should be controlled to avoid congestive heart failure, pulmonary edema, hypertension, and swelling of the legs and feet. Fluid allowances are 1,000-1,5000 milliliters per day and are based on urine output and type of dialysis.

- **Protein**

Protein requirements range from 1.1-1.5 grams per kilogram, depending on the type of dialysis used and the patient's nutritional status. It is important to ensure sufficient protein to maintain visceral protein stores, but to avoid excesses that could lead the accumulation of nitrogenous waste products in the blood (uremia).

- **Phosphorus**

Kidney failure causes high levels of phosphorus to build up in the blood and disrupts calcium/phosphorus balance. Elevated phosphorus levels can lead to metastatic calcification (soft tissue calcification), secondary hyperparathyroidism, and renal osteodystrophy. Recommended intakes usually range from 800-1,000 milligrams per day with hemo-dialysis and less than 1,200milligrams per day with periotoneal dialysis.

- **Potassium**

Potassium restrictions depend on serum potassium levels, the type of dialysis, medications, and residual renal function. Patients on hemo-dialysis are usually restricted to 2,000-3,000 milligrams per day to prevent hyperkalemia between treatments. Patients on peritoneal dialysis may follow a more liberal dietary potassium intake, as potassium is lost in the dialysate solution during daily exchanges.

Cardiovascular Disease (CVD)

➢ Definition of CVD

Cardiovascular disease (also known as heart disease) is a class of disease that involves the heart, the blood vessels (arteries, capillaries and vein) or both. Cardiovascular disease refers to any disease that affects the cardiovascular system. Cardiovascular disease, or CVD for short, is a group of interrelated diseases of the blood vessels and/or the heart, which make up the cardiovascular system, or circulatory system. Diseases which can be identified as CVD include coronary heart disease (CHD), atherosclerosis (hardening of the arteries), hypertension (high blood pressure), peripheral vascular disease, and heart failure.

➢ Types of Cardiovascular Disease

1. Congenital

Ventricular septal defect (VSD)

2. **Awkward**
    - Rheumatic heart disease (RHD)
    - Hypertension
    - Coronary heart disease
    - Stroke

- **Causes of CVD**
    1. Congenital heart disease by rubella viral infections also they are caused by ingestion of harmful drugs by pregnant mother.
    2. Awkward heart disease are caused by variety of factors, they are
        - Hypertension
        - Obesity
        - Diabetes
        - Smoking
        - Lack of exercise
        - Hereditary

- **Symptoms of CVD**
    - Chest pain (angina)
    - Shortness of breath (SOB)
    - Pain in the neck, jaw, throat, upper abdomen or back
    - weakness

- **Prevention of CVD**
    - Fat rich food should be avoided
    - Maintenance of normal body weight
    - Avoid tobacco smoking
    - Increased physical activity
    - Health education about heart disease and method of prevention
    - Specific treatment of congenital heart disease or surgery

- **Dietary Management**

Principle of Diet

Low calorie, low fat, particularly low saturated fat, low cholesterol, high in PUFA withy n-6, n-3 ration= 10:1, low carbohydrate and normal protein, vitamin and minerals are suggested. High dietary fibre should be recommended.

- **Calorie**

Adequate amount of calorie should be given to the normal patient diet, in case of obese person calorie requirement should be reduced. If the person intake excess amount of calorie then the person from obesity, that lead to cardiovascular disease.

- **Protein**

Adequate amount of protein should be given to the patient to meet the daily requirement.

- **Fat**

Fat should supply about 20-25% of the total calories. In that diet the proportion of the saturated and unsaturated to poly unsaturated fat should be 5:6:4. The diet should consist of vegetable oil rich in essential fatty acid (EFA). That helps to reduce blood cholesterol level.

- **Carbohydrate**

Intake of carbohydrate should be reduced. If the person intake excess carbohydrate food like sucrose as a result blood cholesterol level is increased, so complex carbohydrate should include in the diet.

The relationship of dietary carbohydrates to CVD appears to be mediated through indirect mechanisms: contribution to total energy and its effect on overweight and obesity; influence on central obesity; effects on plasma lipids, especially triglycerides and effects on glycaemic control. The balance between carbohydrates and fat as sources of energy as well as the fibre component of the diet. In feeding experiments, an increase in dietary energy from carbohydrates is usually associated with a moderate increase in fasting plasma triglyceride levels in the first few weeks but these return to near original levels in the first few weeks. Epidemiologically, high-carbohydrate intakes are associated with low plasma cholesterol and variable plasma triglyceride concentrations. The effect of a high-carbohydrate diet on HDL cholesterol and thereby on the total to HDL cholesterol ratio as well as on the particle size of LDL are matters of interest while considering the influence on vascular function and risk of CVD. High-carbohydrate diets appear to reduce HDL cholesterol levels and increase the fraction of small dense LDL, both of which may impact adversely on vascular disease. This dyslipidemic pattern is consistent with the elevation of plasma triglycerides.

There is as yet no clear evidence that the risk of CVD is altered independently by the carbohydrate levels in the diet. The glycaemic index of foods might also be a determinant of the extent to which carbohydrates can influence the glycaemic status. Carbohydrate diets with high-glycaemic index might adversely impact on glucose control, with associated changes in plasma lipids.

- **Dietary Fats**

The relationship between dietary fats and CVD, especially CHD has been extensively investigated, with strong and consistent associations emerging from a wide body of evidence accrued from animal experiments, as well as observational studies, clinical trials and metabolic studies conducted in diverse human populations. This relation- ship was initially considered to be mediated mainly through the atherogenic effects of plasma lipids (total cholesterol, lipoprotein fractions and triglycerides). The effects of dietary fats on thrombosis and endothelial function as well as the relationship of plasma and tissue lipids to the pathways of inflammation have been more recently understood. Similarly, the effects of dietary fats on blood pressure have also become more evident through observational and experimental research. The association of plasma total cholesterol and its low- density lipoprotein sub fraction (LDL cholesterol) has been consistently demonstrated across several populations, with the Seven Countries Study offering strong evidence through within-population cohort experience and inter-population ecological comparisons. The protective association of high-density lipoprotein (HDL) fraction of plasma cholesterol has also been well identified and the ratio of total to HDL cholesterol has emerged as a strong predictor of the risk of CHD. Plasma triglycerides too have been directly associated with the risk of atherosclerotic vascular disease and thrombotic events. The effect of various dietary fats on these plasma lipids has constituted the key link in the causal pathway that connects diet to CVD.

Cholesterol in the blood and tissues is derived from two sources: diet and endogenous synthesis. Dairy fat and meat are major sources. Egg yolk is particularly rich in cholesterol but unlike dairy and meat does not provide saturated fatty acids (SFAs). Dietary cholesterol raises plasma cholesterol levels 16. Although both HDL and LDL increase, the effect on the total/HDL ratio is still unfavourable, but small. Observational evidence on an association of dietary cholesterol intake with CVD is contradictory. The upper limit for dietary cholesterol intake has been prescribed, in most guidelines, to be 300 mg/d. However, there is no requirement for dietary cholesterol and it is advisable to keep the intake as low as possible. If intake of dairy fat and meat are controlled then there needs to be no severe restriction of egg yolk intake, although some limitation remains prudent. Fatty acids are grouped into three classes—SFAs, monounsaturated fatty acids (MUFAs) and polyunsatu- rated fatty acids (PUFAs). While such a classification is useful in providing a structural grouping, it tends to oversimplify the effects of dietary fats. Individual fatty acids, within each group, are now known to have differing effects on lipids, lipoproteins and platelet-vascular homeostasis. SFA and MUFA can be synthesized in the body and hence are not dietary essentials. PUFA can be subdivided into n -6 and n-3 PUFA, derived from linoleic acid (LA) and a-linolenic acid (ALNA), respectively. These are essential fatty acids, since they cannot be synthesized in the body.

- **Cholesterol**

The cholesterol intake should be restricted amount 300 mg/day. Food rich in cholesterol like butter, egg, meat and fish (big fish) should only be consumed in restricted amount.

- **Dietary Fibre**

Dietary fibre is a heterogenous mixture of polysacchar-ides and lignin that cannot be degraded by the endogenous enzymes of vertebrate animals. Water-soluble fibres include pectins, gums, mucilages and some hemicelluloses. Insoluble fibres include cellulose and other hemicelluloses. Most soluble fibres reduce plasma total and LDL cholesterol concentrations, as reported by several trials. Pectins, psyllium, gums, mucilages, algal polysaccharides and some hemicelluloses lower total and LDL cholesterol levels without affecting HDL cholesterol, the reductions in total cholesterol being usually in the range of 5 – 10%. Human experiments have clearly shown that oat fibre tends to lower plasma total and LDL cholesterol but wheat fibre does not. Rice bran and barley may also lower cholesterol. Fibre consumption predicted insulin levels, weight gain and cardiovascular risk factors like blood pressure, plasma triglycerides, LDL and HDL cholesterol and fibrinogen more strongly than other dietary components. However, fibre intake may be con-founded with many other determinants of cardiovascular health. large amounts of whole grain cereals have significantly lower rates of CHD. High intake of fibre from cereal sources was associated with a reduced risk of CHD and was inversely associated with the risk of hypertension in the Health Professionals Follow-up Study. Available evidence supports a recommendation for consumption of about 15 g/1000 kcal of fibre. Since some of the reported benefits may have risen from other dietary components occurring in association with fibre in natural foods, dietary consumption of high-fibre rather than isolated fibre foods should be recommended. Addition of wheat or cereal bran may be considered, where necessary, to supplement natural foods in order to attain the recommended dietary intake.

- **Vitamins**

Adequate amount of various vitamins should be included in the patient diet. Nicotinic acid has used therapeutically to reduce serum cholesterol level.

- **Minerals**

Adequate amount of mineral should be given, in case of hypertension Na may be restricted. The intake of sodium is 1600-2300 in CVD patient.

➢ **Guideline for Management of the CVD**

- Consume a diet rich in fruits and vegetables
- Choose whole grain, high fiber foods
- Consume fish at least twice a week
- Limit saturated fat to less than 7% of total calories, trans fats to less than 1% of calories, and cholesterol to less than 300 mg per day. These recommendations can be achieved by choosing lean meats, dairy products that are fat-free, 1% or low-fat, and minimizing intakes of foods containing hydrogenated fats
- Limit intakes of foods and drinks with added sugars
- Choose and prepare foods with little not no added salt
- Consume alcohol in moderation
- Balance calories intakes and physical activity levels to achieve a healthy body weight.

➢ **Food Should be Included**

- Fruits and vegetables
- Green tea
- Chicken without fat
- Skimmed milk
- Salad
- Almond

Food should be avoided

- Fast food and junk food

- Oily food
- Mutton
- Alcohol
- Fat rich food
- Outside food

Coronary Heart Disease (CHD)

Definition of Coronary Heart Disease (CHD)

Coronary heart disease is also called as ischemic heart disease. It is defined as “impairment of heart function”. It occurs due to obstructive changes in coronary circulation of heart.

The Various Form of This Disease are

- Angina pectoris
- Myocardial infection
- Cardiac failure
- Sudden death

➢ **Causes**

- If the person consumed excess fat rich food then they suffer from CHD.
- Hypertension and diabetes
- Excessive smoking and alcohol
- Sedentary life style and lack of exercise
- Obesity and increased body weight

➢ **Prevention and Control**

- Fatty food should be avoided
- Control hypertension and diabetes
- Avoid tobacco smoking and alcohol
- Reduction of body weight
- Daily exercise
- Health education about risk factor in CHD and advice to avoid them.

➢ Management of CHD

Note: Same as management of cardiovascular disease

Atherosclerosis

➢ Definition of Atherosclerosis

The word atherosclerosis is derived from the “Greek” word “athera” that means gruel and “sclerosis” that means “hardening”. The term atherosclerosis is used to denote a condition in which lip [id is deposited in blood vessels.

Causes

➢ Prevention and Control

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- **Causes** High calorie intake
- High saturated fat and cholesterol intake
- Increased level of cholesterol in the blood
- Sedentary life style
- Stress

➢ Clinical Features or Symptoms of the Atherosclerosis

- Angina pectoris
- Myocardial infection

- Coronary occlusion
- Coronary infection

➢ Risk factors of Atherosclerosis

It is classified in to two phases

1. Non- Modifiable Risk Factor

The non-modifiable risk factors are

A. Age

This types of disease are increased at middle age between 50-55 years

B. Sex

It is high in men than women. After menopause the incidents are increased in women and by the age group of 70 years.

C. Family History

This may be due to a combination of genetic environmental and life style.

2. Modifiable Risk Factors

A. Smoking

Cigarette smoking increases endothelial damage and increased heart rate, blood pressure and increased LDL level in the blood.

B. Hypertension

High blood pressure leads to endothelial cell damage. Hypertension is an independent risk factor for both CHD and stroke.

➢ Role of the HDL to Protect Body from Atherosclerosis

- It helps to transport cholesterol, which is reserved, from the tissue throughout the body to the liver.
- It acts as an antioxidant in the blood vessels.

➢ Role of fat in the Development of Atherosclerosis

Fat, mainly cholesterol and TG carried in the blood stream, with the help of lipoprotein like- chylomicrons, VLDL, LDL,HDL, of which LDL is responsible for atherosclerosis. When blood cholesterol is high, some LDL gets slack to blood vessel walls and narrows them. High LDL decreases endothelium derived relaxing factors and lead to plaque and intra-vascular thrombosis and ultimately clot is formed, which occludes blood flow and leads to atherosclerosis.

Hyperlipidemia

- **Definition of hyperlipidemia**

It is the family of disorder that are characterized by abnormally high levels of lipid (fats in the blood)

- **Classification**

The hyperlipidemias are classified in to two phases

1. **Type-1 Hyperlipidemia**

This type of hyperlipidemia is known as hyper chylomicronemia. Type-1 hyperlipidemia is rate ans it is characterized by milky fasting plasma.

2. **Type-2 Hyperlipidemia**

It is characterized by two categories

- **Type- 2-A**

This type of hyperlipidemia is known as pure hyperlipidemia. In this condition β lipo protein is increased.

- **Type 2-B**

This type of hyperlipidemia is known as mixed hyper lipidemia. In this condition β lipop protein is increased.

Cholesterol level are elevated in both hyperlipidemia.

3. **Type-3 Hyperlipidemia**

It is due to an abnormal lipo protein which usually appears on electrophoresis as a broad β bond. In this condition both cholesterol level and triglyceride level are increased. It is known as floating hyperlipidemia.

4. **Type-4 Hyperlipidemia**

This type of hyperliupidemia is known as endogenous hyperlipidemia or lipemia.

It occurs due to increase both cholesterol level and triglyceride level.

5. **Type -5 Hyperlipidemia**

It is known as mixed lipemia. In this disease both triglyceride and cholesterol level are increased.

- **Clinical Features**

  - Obesity
  - Diabetes mellitus

- Hypothyroidism
- Nephritic syndrome
- Glycogen storage disease
- Hyper uricemia

➢ **Dietary Management of Hyperlipidemia**

- **Calorie**

The energy requirement in type-1 and type-2 A hyperlipidemia is 2400 kcal, and the energy requirement in type-2 B, type-3,4and 5 are 2000 kcal.

- **Fat**

Fat is restricted in hyperlipidemia patient. Vegetable oil containing fat like PUFA and MUFA should be included. In the type-1 andtype-2 patient the fat restricted is 10% of total calories, and 20% of total calories. Type-3 B and type-3 20%, type-4 40%, type-5 50%.

- **Protein**

In this type-1 and type-2 A the protein requirement is normal, but in type -2 B, type-3. Type -4 and type-5 hyperlipidemia patient high protein (100-120 gm) diet is required.

- **Carbohydrate**

In hyperlipidemia patient the requirement of carbohydrate is 200-400 gm/ day (type-1 70% of the diet) type-2 A 60% of the diet, type-2 B and type-3 60% of the diet, type-4 40% of the diet and type 5 50% of the diet.

- **Cholesterol**

Cholesterol containing food should be avoided in the patient diet

Obesity

➢ **Definition of Obesity**

Obesity is a condition in which the individual is overweight due to deposition of fat in the adipose tissue.

➢ **Assessment of Obesity**

Obesity can be assess by

A. Body weight (kg)

An adult weighting 10% more than the standard is overweight and 20% more is obese.

Percentage Body weight Degree of Obesity

Excess of Normal

1. 25% 1. Mild
2. 50% 2. Moderate
3. 75% 3. Severe
4. 100% 4. Very Severe

B. Body Mass Index (BMI)

It is also called quet let index. It is expressed by following formula.

BMI= weight in kg/ height in miter square.

- **Grading of Obesity Based on BMI**

Category BMI

1. Grade-III > 40
2. Grade- II 30-40
3. Grade-I 25-29.99
4. Normal 18.5-24.99

C. Waist Circumference (cm)

D. Ponderal index (PI)

This index is given by following formula

PI= height in inch/$^{3\surd}$ weight in pound/ (LBS):

E. Waist Hip Ratio (WHR)

The cut of point of waist hip ration is

1. Male- Greater Than 0.95
2. Female- 0.85

F. Broka's Index

The formula of broka's index is-

Height in cm-100= ideal body weight (kg)

- **Classification of Obesity**

1. Android obesity/ male Pattern

Obesity in which fat is localized around the waist and in the upper body, most frequently seen in men and having a poorer prognosis for morbidity and mortality than the gynecoid obesity type.

2. Gynecoid Obesity/ Female Type

Obesity in which fat is localized in lower half of the body, most frequently seen in women and having a better prognosis for morbidity and mortality than the android type.

➢ Complication of Obesity

1. Physical dis-Ability

Due to extra load of the body there may be result physical dis-ability of person. Complications like- osteoarthritis of knee, hip and lumbar spine pain.

2. Metabolic Disorder

Obesity is associated with a member of metabolic disorder like- diabetes mellitus, atherosclerosis etc.

3. Cardiovascular Disorder

Apart from the development of atherosclerosis is to develop hypertension.

4. Sleep Apnea

5. Low File Expectancy

➢ Causes of Obesity

1. Physical Inactivity

Physical inactivity may cause obesity, obesity is found in person who lead sedentary

2. Eating Habit

Eating habit is the common causes of obesity, people who consume over fatty rich food and consume highly cholesterol rich food, they are suffer from obesity.

3. Endocrine Factor

Obesity is found in hypothyroidism, hyperthyroidism and cushign’s syndrome. Obesity is common in puberty, pregnancy and menopause.

4. Genetic Factor

Obesity is a rare genetic disorder

5. Drugs

Certain drugs oral contraceptive pills may cause obesity

6. Sex

Men more than weight gain between the ages of 29-35 years where women gain must between 45-49 years of age.

➢ Dietary Management of Obesity

Principle of diet

Low calorie, normal protein, vitamin, minerals and restricted amount of carbohydrate and fat and high amount of fibre should be given in such cases.

- **Calorie**

Adequate amount of calorie should be given to the normal person, in case of obese person calorie requirement should be restricted. The calorie requirement of sedentary and active worker is about 20 kcal and 25 kcal/ kg ideal body weight and for heavy worker calorie requirement is 40 kcal / kg body (ideal) weight.

- **Protein**

About 0.8-1 gm of protein / kg body weight is prescribed for tissue repaired and specific dynamic action.

- **Carbohydrate**

High carbohydrate rich food like- potato, rice are restricted, and sugar which gives completely high calorie, this food item should be avoided in the diet. Choose fiber-rich fruits, vegetables, and whole grains often Choose and prepare foods and beverages with little added sugars or caloric sweeteners, such as amounts suggested by the USDA Food Guide and the DASH Eating Plan Reduce the incidence of dental caries by practicing good oral hygiene and consuming sugar - and starch-containing foods and beverages less frequently

- **Fat**

Low fat or no fat diet should be given to the diet, food rich in fat like nuts, oil, seed should be avoided and skimmed milk should be preferred. Consume less than 10% of calories from saturated fat and less than 300 mg/day of cholesterol Limit intake of fats and oils high in saturated and trans-fatty acids; keep trans-fatty acid intake as low as possible Consume 20% - 35% of total calories from fat; emphasize polyunsaturated and monounsaturated fatty acids (i.e. fish, nuts, vegetable oils) Choose and prepare meat, poultry, dry beans and milk or milk-products that are lean, low-fat or fat-free

- **Vitamin and Minerals**

Fat soluble vitamin likes A, D, E, and K should be given in restricted amount. Among minerals sodium is help full in weight reduction, Consume potassium-rich foods daily such as fruits and vegetables while choosing and preparing foods with little salt but in case of hypertension sodium requirement should be restricted.

- **Alcohol**

Those who choose to drink alcohol should do so in moderation; defined as 1 drink per day for women; 2 drinks per day for men.

- **Fibre**

Fibre requirement should be increased. Whole grain, cereal, vegetable, pulses, should be given to the obese person diet. Dietary fibre may improve some of the metabolic aberrations seen in obesity.

➢ **Guideline for Management of the Obesity**

- Low fat rich foods
- Consume a diet rich in fruits and vegetables
- Used rice bran oil for cooking
- Limit intakes of foods and drinks with added sugars
- Fast food and junk food should be avoided
- Fried food should be avoided
- Daily exercise
- 2 to 3 pieces almond should be taken

➢ **Food Should be Included**

Fruits and leafy vegetables

- Almond
- Green tea
- Small fish
- Cucumber
- Carrot
- Skimmed milk
- Chicken

- **Food Should be Avoided**
  - Potato
  - Sugar
  - Fried food
  - Fast food and junk food
  - Ghee
  - Mutton
  - Butter

Constipation

- **Definition of Constipation**

It is characterised by frequent and incomplete evacuation of the stool. Constipation may be defined as less than three months per week or as difficulty or painful defecation.

- **Symptoms of Constipation**
  - Having lumpy, hard, dry stool that's difficult to pass
  - Straining to pass stool
  - Feeling like there's a blockage in the intestines or rectum
  - Pain or bloating in the abdomen
  - Reduced appetite
  - Sluggishness or lethargy
- **Types of Constipation**

In Physical Practise the Term Constipation Is Used to Denote 4 types

1. Atonic constipation/ tonic, colonic stasis.
2. Dyschezia constipation (blood+ stool)
3. Spastic constipation/ irritability
4. Intestinal obstruction

1. Atonic Constipation

It is the most common type of constipation, if the intestinal walls lack of muscular tone, so that peristaltic acid is impaired.

Causes

- Inadequate intake of roughage in the diet

- Inadequate intake of fluids
- Lack of physical exercise
- Weakness of the voluntary muscle at defecation
- Excessive use of purgatives

2. Dyschezia Constipation

It is a one type of constipation. This condition occurs due to lack of muscular tone of rectum. It is differs from atonic constipation in two reasons:

The subject passes hard stool once in two or three days

The subjects do not have an urge to defecate, when the rectum is distended with faeces.

Causes

- The important causes of this type of constipation are as follows
- Lack of roughage in the diet
- Weakness of the abdominal muscle, and muscle of the pelvis floor.
- Low fibre intake and water intake

3. Spastic Constipation

The spastic constipation is also known as irritable colon syndrome. It is caused by an over stimulation of intestinal nerve ending. The condition may be accompanied by abdominal colic pain, nausea, atonic constipation

Causes

- Emotional stress
- Nervous disturbance
- Excessive smoking and drinking
- High intake of tea and coffee

4. Intestinal Obstruction Constipation

It is an another type of constipation. In this condition intestinal obstruction may occurs.

➢ Dietary Management of Constipation

In this time dietary modification diet should be needed to prevent this condition.

Principle of Diet

High fibre, low fat, moderate amount of protein and carbohydrate should be given to the patient diet.

- **Fat**

Fat containing food such as butter, cream, oils should be given because it is good source of essential fatty acid that helps to stimulate muscle membrane to excretion the stool.

- **Dietary Fibre**

Intake of dietary fibre should be increased by eating whole cereals, vegetable because fibre has more water holding capacity.

- **Soluble Fibre**

Soluble fiber is completely digested by the body and aids in reducing cholesterol, stabilizing blood sugar, and getting rid of other toxins present in the gastrointestinal tract. Soluble fiber functions as a bulking agent and slows down the movement of waste through the gastrointestinal tract. Examples of foods that contain soluble fiber include oats, beans, legumes, sweet potatoes, onions, and fruits such as apples, bananas, and pears.

- **Insoluble Fibre**

Insoluble is not digested by the body and is excreted as waste. This is the type of fiber that promotes bowel regularity and discourages the development of hemorrhoids. Examples of foods that contain insoluble fiber include wheat bran, nuts, seeds, and skins on vegetables and fruits.

Both soluble and insoluble fiber are important for overall good health and nutrition. When patients are experiencing constipation, it may be beneficial to include more insoluble fiber in diet to promote regularity. It is important to increase fiber slowly over the course of a few weeks. Adding too much fiber too quickly can make constipation worse. Below are some general guidelines for alleviating constipation.

- **Carbohydrate**

Bran should be included in the dirt, as a break fat, because it also has more water holding capacity

- **Fluid**

Adequate amount of fluid like milk, fruit juice and adequate amount of water should be given to the patient diet.

- **Dietary Guidelines**
  - Eating foods rich in dietary fibre especially soluble fibre helps in increasing stool bulk, produces more frequent stools, attracts water making stools soft and ease in elimination.
  - Maintain the body weight near to ideal body weight.
  - Avoid junk foods especially prepared from refined flour.
  - Have plenty of water or fluids with at least 10-12 glasses of water.
- **Food Should be Included**
  - High fibre rich food like whole grain (wheat, oats)
  - Whole cereals like daliya
  - Jowar
  - Oatmeal
  - Beans and whole pulses
  - Fibrous fruits
  - Vegetables especially glvs (green leafy vegetables)
  - Flaxseeds
  - Anjeer (Dumoor)
  - Raisins (Dried grape)
- **Food should be avoided**
  - Chips
  - Fast food
  - Ice cream
  - Meat
  - Prepared foods, such as some frozen meals and snack foods
  - Processed foods, such as hot dogs or some microwavable dinners
  - Starchy foods like refined flour
  - Sooji
  - Banana
  - Washed pulses, Potatoes
  - Sweet potato
  - Fried foods
  - Highly spiced foods

Anaemia

➢ Definition of Anemia

Anaemia is a condition in which there is diminished O_2 capacity of the blood, as a result of reducing in total circulating hemoglobin and reducing in red cell mass.

Anemia is a global public health problem affecting both developing and developed countries at all age group. According to the World Health Organization (WHO), “Anemia is defined as hemoglobin (Hb) levels <12.0 g/dL in women and <13.0 g/dL in men”. However, normal Hb distribution varies not only with sex but also with ethnicity and physiological status. New lower limits of normal Hb values have been proposed, according to ethnicity, gender, and age. Anemia is often multifactorial and is not an independent phenomenon.

➢ Cut of Value of Hemoglobin

Table 2: cut of value of hemoglobin

Childrens	
Birth:	13.5 to 24.0 g/dl (mean 16.5 g/dl)
<1 mth:	10.0 to 20.0 g/dl (mean 13.9 g/dl)
1-2 mths:	10.0 to 18.0 g/dl (mean 11.2 g/dl)
2-6 mths:	9.5 to 14.0 g/dl (mean 12.6 g/dl)
0.5 to 2 yrs:	10.5 to 13.5 g/dl (mean 12.0 g/dl)
2 to 6 yrs:	11.5 to 13.5 g/dl (mean 12.5 g/dl)
6-12 yrs:	11.5 to 15.5 g/dl (mean 13.5)
Females	
Age 12-18 yrs:	12.0 to 16.0 g/dl (mean 14.0 g/dl)
Age >18 rs:	12.1 to 15.1 g/dl (mean 14.0 g/dl)
Males	
12-18 yrs:	13.0 to 16.0 g/dl (mean 14.5 g/dl)
>18 yrs:	13.6 to 17.7 g/dl (mean 15.5 g/dl)

➢ Nutritional Anaemia

Nutritional anaemia may be defined as the condition of reduction of normal hemoglobin concentration or amount of inadequate supply of one or more nutrients. Nutritional anaemia may occur due to deficiency of any dietary nutrient that involves in the formation of hemoglobin.

Types of Anaemia

There are several types and classifications of anaemia. The occurrence of anaemia is due to the various red cell defects such as production defect (aplastic anaemia), maturation defect (megaloblastic anaemia), defects in haemoglobin synthesis (iron deficiency anaemia), genetic defects of haemoglobin maturation (thalassaemia) or due to the synthesis of abnormal haemoglobin (haemoglobinopathies, sickle cell anaemia and thalassaemia) and physical loss of red cells.

1. Iron-Deficiency Anaemia

Iron is one of the most important nutrient for hemoglobin synthesis in human body. Iron deficiency anaemia is a condition in which the body has too little iron in the bloodstream. This form of anaemia is more common in adolescents and in women before menopause. Blood loss from heavy periods, internal bleeding from the gastrointestinal tract, or donating too much blood can all contribute to this disease.

Causes

- **Inadequate Iron Intake**

If the person does not intake adequate amount of iron rich foods like beans, lentils, tofu, baked potatoes, cashews and dark green leafy vegetables such as spinach, fortified breakfast cereals, whole-grain and enriched breads etc then the person suffer from iron deficiency anaemia.

- **Inadequate Utilization of Iron**

This can take place secondary to chronic gastro intestinal disturbances, defective release of iron from the iron store in to the plasma and defective iron utilization in other chronic disorder.

- **Increased Requirement**

Anaemia can occurs during periods of accelerated demands likes in infancy, adolescence, pregnancy, and lactation.

- **Inadequate Absorption of Iron**

Inadequate iron absorption occurs during diarrhea, in chronic renal disease, excessive amount of phytates and phosphates in the diet and excessive consumption of tea can decreases the absorption of iron.

Symptoms

- Diminished work performance

- Cognitive development
- Behavior implication
- Tiredness
- Lethargy
- Feeling faint and becoming breathless easily
- Headaches, irregular heartbeats (palpitations)
- Altered taste, sore mouth and ringing in the ears (tinnitus).

➢ **Management**

- Oral administration of inorganic iron in the ferrous form, ferrous sulfate 50-200 mg/day 3 times for adults and 6mg/ kg for children.
- Ascorbic acid greatly increases iron absorption through its capacity, to maintain iron in the reduce state.
- Iron therapy should be continued for several month after re-absorption of normal hemoglobin levels.

2. Pernicious Anaemia

Pernicious anaemia is the most common cause of Vitamin B12 deficiency. Vitamin B12 is essential for human health. It is needed to make new cells in the body such as the many new red blood cells which are made every day. Meat, fish, eggs, and milk these are good source of Vitamin B12. A lack of vitamin B12 leads to Pernicious anaemia and sometimes to other problems. A lack of vitamin B12 (B12 deficiency) is one cause of Pernicious anaemia. Pernicious anaemia usually develops over the age of 50 years. In this type of anaemia, women are more commonly affected than men, and it tends to run in families. It occurs more commonly in people who have other autoimmune diseases. Certain medicines used also may affect the absorption of vitamin B12.

➢ **Causes**

- **Inadequate Ingestion**

Chronic alcoholism, poverty, releasing taboos and dietary fads can cause pernicious anaemia

- **Inadequate Utilization**

This is due to the presence of vitamin B12 antagonized.

- **Inadequate Absorption**

Inadequate or absence of secretion of intrinsic factos due to hereditary and endocrine disorder associated with GI damage.

- **Symptoms**

Psychological problems like depression, confusion, difficulty with memory or even dementia and Nervous problems like numbness, pins and needles, vision changes and unsteadiness. Common symptoms are given below.

- Abnormal discomfort
- Anorexia
- Weight loss
- General weakness
- Redness and swelling (inflammation) of the tongue (**glossitis**)
- Frequent diarrhoea

- **Management**

High protein diet (100-150 gm) of protein with high calorie diet is required.

- Spices and condiments food should be avoided from the diet
- A soft diet is recommended for anorexia and irritation of GI patient.
- Ascorbic acid is given to the patient diet and high protein and high calorie should be given between 2-3 times daily.

3. Haemolytic Anaemia

Haemolytic anaemia is a condition in which red blood cells are destroyed and removed from the bloodstream before their normal lifespan is up. Haemolytic anaemia can affect people of all ages, races and sexes.

- **Causes of Hemolytic Anemia may Include**

- Inherited conditions, such as sickle cell anemia and thalassemia
- Stressors such as infections, drugs, snake or spider venom, or certain foods
- Toxins from advanced liver or kidney disease
- Inappropriate attack by the immune system (called hemolytic disease of the newborn when it occurs in the fetus of a pregnant woman)
- Vascular grafts, prosthetic heart valves, tumors, severe burns,

exposure to certain chemicals, severe hypertension, and clotting disorders

- In rare cases, an enlarged spleen can trap red blood cells and destroy them before their circulating time is up.

➢ **Symptoms**

- Fatigue,
- Pain
- Arrhythmias
- An enlarged heart and heart failure.

➢ **Treatment**

Treatments for haemolytic anaemia include blood transfusions, medicines, plasmapheresis, surgery, blood and marrow stem cell transplants and lifestyle changes.

4. Sickle Cell Anaemia

Anaemia in which the body makes sickle-shaped ("C"-shaped) red blood cells is called Sickle Cell anaemia. It is a rate genetic or hereditary disease. It occurs due to the presence of an abnormal hemoglobin (HbS). It differs from the normal hemoglobin (HbA) by the presence of valine. In which the body makes sickle shaped red blood cell. Sickle shaped means that the red blood cells are shaped like a crescent.

➢ **Symptoms**

- Severe pain
- Chest pain and difficult breathing
- Strokes
- Severe infection

➢ **Dietary Management**

- High calorie and high micro nutrient diet should be needed to the patient diet, who suffers from sickle cell anaemia.
- Whole green leafy vegetable, legumes and fruits should be included in the diet to prevent deficiency.
- Fruit supplement food should be given to prevent the hydration.
- One multivitamin tablet should be given to the patient diet.
- Vitamin E, B_6 , A and minerals like Zink should be provided.

- Omega-3 fatty acid rich food like olive oil, ground nut and fish etc should be given to the patient diet.

Hemorrhoids

➢ Definition of Hemorrhoids

Hemorrhoids are swollen and inflamed veins around the anus or in lower rectum. It is also known as piles. Hemorrhoids are common in both men and women and about half of adults older than age 50 have hemorrhoids.

➢ Types of Hemorrhoids

The two types of hemorrhoids are

- External hemorrhoids, which form under the skin around the anus
- Internal hemorrhoids, which form in the lining of the anus and lower rectum

➢ Complications of Hemorrhoids

Complications of Hemorrhoids can include the Following

- Blood clots in an external hemorrhoid
- Skin tags extra skin left behind when a blood clot in an external hemorrhoid dissolves
- Infection of a sore on an external hemorrhoid
- Strangulated hemorrhoid, when the muscles around anus cut off the blood supply to an internal hemorrhoid that has fallen through the anal opening
- Anemia

➢ Symptoms of Hemorrhoids

The symptoms of hemorrhoids depend on the types

In case of External Hemorrhoids

- Anal itching
- One or more hard, tender lumps near your anus
- Anal ache or pain, especially when sitting

Too much straining, rubbing, or cleaning around the anus may make symptoms worse. For many people, the symptoms of external hemorrhoids go away within a few days.

In case of Internal Hemorrhoids

- Bleeding from rectum, bright red blood on stool or in the toilet bowl after a bowel movement.
- A hemorrhoid that has fallen through the anal opening, called prolapse

Internal hemorrhoids that are not prolapsed most often are not painful. Prolapsed internal hemorrhoids may cause pain and discomfort.

Although hemorrhoids are the most common cause of anal symptoms, not every anal symptom is caused by a hemorrhoid. Some hemorrhoid symptoms are similar to those of other digestive tract problems. For example, bleeding from the rectum may be a sign of bowel diseases such as Crohn's disease, ulcerative colitis, or cancer of the colon or rectum.

➢ Causes of Hemorrhoids

The causes of hemorrhoids include

- Straining during bowel movements
- Sitting on the toilet for long periods of time
- chronic constipation or diarrhea
- A low-fiber diet
- Weakening of the supporting tissues in your anus and rectum that happens with aging
- Pregnancy
- Often lifting heavy objects

➢ Treatment of Hemorrhoids

- Eating foods that are high in fiber
- Taking a stool softener or a fiber supplement such as psyllium (metamucil) or methylcellulose (citrucel)
- Drinking water or other nonalcoholic liquids each day as recommended by health care professional
- Not straining during bowel movements
- Not sitting on the toilet for long periods of time
- Taking over the counter pain relievers such as acetaminophen , ibuprofen , naproxen , or aspirin
- Sitting in a tub of warm water, called a sitz bath, several times a day to help relieve pain

- **Food should be included**
  - Fruits and vegetables
  - High fibre rich food
  - Adequate amount of water
- **Food should be avoided**
  - Cheese
  - Chips
  - Fast food
  - Ice cream
  - Meat
  - Prepared foods, such as some frozen and snack foods
  - Processed foods, such as hot dogs and some microwavable dinners

Gout

- **Definition of Gout**

Gout is a common and complex form of arthritis that can affect anyone. It's characterized by sudden, severe attacks of pain, swelling, redness and tenderness in the joints, often the joint at the base of the big toe.

- **Symptoms**

The Signs and Symptoms of gout Almost Always Occur Suddenly, and Often at Night. They include

- **Intense Joint Pain:** Gout usually affects the large joint of big toe, but it can occur in any joint. Other commonly affected joints include the ankles, knees, elbows, wrists and fingers. The pain is likely to be most severe within the first four to 12 hours after it begins.
- **Lingering Discomfort:** After the most severe pain subsides, some joint discomfort may last from a few days to a few weeks. Later attacks are likely to last longer and affect more joints.
- **Inflammation and Redness:** The affected joint or joints become swollen, tender, warm and red.
- **Limited Range of Motion:** As gout progresses, patient may not be able to move joints normally.

➢ Causes

- Gout occurs when urate crystals accumulate in joint, causing the inflammation and intense pain of a gout attack. Urate crystals can form when patient have high levels of uric acid in blood.
- The body produces uric acid when it breaks down purines substances that are found naturally in the body.

Purines are also found in certain foods, such as steak, organ meats and seafood. Other foods also promote higher levels of uric acid, such as alcoholic beverages, especially beer, and drinks sweetened with fruit sugar (fructose).

Normally, uric acid dissolves in the blood and passes through the kidneys into urine. But sometimes either body produces too much uric acid or kidneys excrete too little uric acid. When this happens, uric acid can build up, forming sharp, needlelike urate crystals in a joint or surrounding tissue that cause pain, inflammation and swelling. If the patient consumes excess amount of Purine rich food, then the patients are suffering from gout.

➢ Risk Factors

- **Diet:** Eating a diet rich in meat and seafood and drinking beverages sweetened with fruit sugar (fructose) increase levels of uric acid, which increase the risk of gout. Alcohol consumption, specially of beer, also increases the risk of gout.
- **Certain Medications:** The use of thiamine diuretics commonly used to treat hypertension and low-dose aspirin also can increase uric acid levels. So can the use of anti-rejection drugs prescribed for people who have undergone an organ transplant.
- **Recent Surgery or Trauma:** Experiencing recent surgery or trauma has been associated with an increased risk of developing a gout attack.
- **Obesity.** In case of overweight, the body produces more uric acid and kidneys have a more difficult time eliminating uric acid.
- **Medical Conditions:** Certain diseases and conditions increase the risk of gout. These include untreated high blood pressure and chronic conditions such as diabetes, metabolic syndrome, and heart and kidney diseases.
- **Age and Sex:** Gout occurs more often in men, primarily because

women tend to have lower uric acid levels. After menopause, however, women's uric acid levels approach those of men. Men are also more likely to develop gout earlier usually between the ages of 30 and 50 whereas women generally develop signs and symptoms after menopause.

- **Family History of Gout:** It is hereditary problem.

Complications

People with gout can develop more-severe conditions, such as:

- **Recurrent Gout:** Some people may never experience gout signs and symptoms again. Others may experience gout several times each year. Medications may help prevent gout attacks in people with recurrent gout. If left untreated, gout can cause erosion and destruction of a joint.
- **Advanced Gout:** Untreated gout may cause deposits of urate crystals to form under the skin in nodules called tophi (TOE-fie). Tophi can develop in several areas such as fingers, hands, feet, elbows or Achilles tendons along the backs of ankles. Tophi usually aren't painful, but they can become swollen and tender during gout attacks.
- **Kidney Stones:** Urate crystals may collect in the urinary tract of people with gout, causing kidney stones. Medications can help reduce the risk of kidney stones.

Dietary Guidelines may help Protect Against Future Gout Attacks

- Drink plenty of fluids.
- Limit or avoid alcohol
- Get your protein from low-fat dairy products.
- Limit your intake of meat, fish and poultry.
- Maintain a desirable body weight.

Foods should be Included

A low-purine diet can help lower uric acid levels and work to prevent symptoms of gout.

- Beans and lentils
- legumes
- Fluids, especially water

- Low-fat or fat-free dairy
- whole grains, such as oats, brown rice, and barley
- Quinoa
- Sweet potatoes
- Fruits and vegetables

➢ **Foods should be avoided**

A gout-friendly diet will help to control uric acid levels in the body while promoting overall health.

- Red meat
- Sugary beverages
- Alcohol

All of these Foods have High Purine Content. With that in Mind, a Gout diet should avoid or Limit these Foods

- Organ meats, such as brain, sweetbreads, heart, kidney, and liver
- Beef
- Pork
- Lamb
- Herring, anchovies, smelt, and sardines
- Mackerel and tuna
- Mussels and scallops
- Yeast
- Beer, wine, and liquor
- Fruit juices
- Soda

Chapter - 3

Dietician, there Types and Role

A dietitian (or dietician) is an expert in dietetics; that is, human nutrition and the regulation of diet. A dietitian alters their patient's nutrition based upon their medical condition and individual needs. Dietitians are regulated healthcare professionals licensed to assess, diagnose, and treat nutritional problems.

A registered dietitian (RD) or registered dietitian nutritionist (RDN) is a dietitian who meets all of a set of special academic and professional requirements, including the completion of a bachelor's degree with an accredited nutrition curriculum, an internship at an approved health-care facility, foodservice organization, or community agency, and satisfactory performance on a registration exam.

Roughly half of all RDNs hold graduate degrees and many have certifications in specialized fields such as sports, pediatrics, renal, on cological, food-allergy, or gerontological nutrition. After learning about a patient's health history, favorite foods, eating and exercise habits, the RD helps the person to set goals and to prioritize. Follow-up visits often focus on maintenance and monitoring progress.

Most RDs work in the treatment and prevention of disease (administering medical nutrition therapy, as part of medical teams), often in hospitals, health-maintenance organizations, private practices, or other health-care facilities. In addition, a large number of registered dietitians work in community and public-health settings, and/or in academia and research. A growing number of dietitians work in the food industry, journalism, sports nutrition, corporate wellness programs, and other non-traditional dietetics settings.

➢ Types of Dietician

Although many dietitians and nutritionists do similar tasks, there are several specialties within the occupations. The following are examples of types of dietitians and nutritionists:

- Clinical dietitians and nutritionists: provide medical nutrition therapy. They work in hospitals, long-term care facilities, clinics, private practice, and other institutions. They create nutritional programs based on the health needs of patients or residents and counsel patients on how to lead a healthier lifestyle. Clinical dietitians and nutritionists may further specialize, such as working only with patients with kidney diseases or those with diabetes.

- Community dietitians and nutritionists: develop programs and counsel the public on topics related to food and nutrition. They often work with specific groups of people, such as adolescents or the elderly. They work in public health clinics, government and nonprofit agencies, health maintenance organizations (HMOs), and other settings.
- Management dietitians**:** plan meal programs. They work in food service settings such as cafeterias, hospitals, prisons, and schools. They may be responsible for buying food and for carrying out other business-related tasks such as budgeting. Management dietitians may oversee kitchen staff or other dietitians.

➢ **Roles of Dietitians**

- Identifying nutrition problems and assessing the nutritional status of patients in a clinical setting.
- Developing diet plans and counseling patients on special diet modifications.
- Assessing, promoting, protecting, and enhancing the health of the general public in a community setting and providing strategies for prevention of nutrition-related diseases.
- Managing a cost effective food production operation, distributing high quality meals/snacks, and monitoring sanitation and safety standards in a food service setting.
- Operating private consulting practices to provide expertise in nutrition, as well as promote health and prevent disease
- Working with individuals, groups, workplaces and media to provide dietary advice for healthy living.
- Working with food and pharmaceutical companies to provide research, develop products, educate consumers, and promote and market better food and nutritional products in a business setting.
- Teaching nutrition, food chemistry, or food service administration to students in any health profession and at all levels of education.

Chapter - 4

Food and Drug Interaction

When a food affects medications in the body, this is called food-drug interaction. There are a variety of food and drug interactions that can occur, but here is a small list of common drugs and how food affects the way they are used in the body. A drug-food interaction occurs when the food and medicine interfere with one another. Some medicines cannot be taken with certain types of food. The food can cause a reaction that changes the effect of the medicine. It also can create or heighten side effects. An example of this is having grapefruit or grapefruit juice with cholesterol drugs. If patient take an ACE inhibitor, then patient should avoid foods high in potassium, such as bananas.

1. Calcium Rich Foods + Antibiotics

Dairy products such as milk, yogurt, and cheese can interfere with certain medications, including antibiotics such as tetracycline, doxycycline, and ciprofloxacin. These antibiotics may bind to the calcium in milk, forming an insoluble substance in the stomach and upper small intestine that the body is unable to absorb.

2. Pickled, Cured, and Fermented Foods + MAIOs

This food category contains tyramine, which has been associated with a dangerous increase in blood pressure among patients taking monoamine oxidase inhibitors (MAIOs) and certain medications for Parkinson's disease.

3. Vitamin K Rich Foods + Warfarin + Acitrom

Pharmacists should counsel patients taking warfarin to maintain a consistent intake of vitamin K and avoid introducing kale, spinach, and other leafy greens to their diets. Vitamin K is vital for the production of clotting factors that help prevent bleeding, but anticoagulants like warfarin exert their effect by inhibiting vitamin K. Therefore, an increased intake of the nutrient can antagonize the anticoagulant effect and prevent the drug from working.

4. Alcohol + Prescription Stimulants

Patients should always be wary of mixing any medication with alcohol, but some interactions are more serious than others. For instance, ingesting alcohol while taking a prescription stimulant could cause the patient to not fully realize how intoxicated they are. This is especially true when the stimulant is being abused, but it can also happen when the patient takes the drug as prescribed.

5. Grapefruit and Grapefruit Juice + Statins

Patients should avoid eating grapefruit or drinking grapefruit juice while taking some medications, in particular statins. Compounds in grapefruit called furanocoumarin chemicals cause an increase in medication potency by interacting with enzymes in the small intestine and liver. This interaction partially inactivates a number of medications under normal circumstances.

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